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FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE- 10TH FL.
NEW YORK, NY 10151

EXAMINER	
STORM, DONALD L	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/089,925	KONDO ET AL.	
	Examiner	Art Unit	
	Donald L. Storm	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *April 5, 2002 through October 3, 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-53* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-3,6 and 8* is/are allowed.

6)☒ Claim(s) *10,11 and 13-53* is/are rejected.

7)☒ Claim(s) *4,5,7,9 and 12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 August 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. Claims 1-3, 6, and 8 are allowed. Claims 4, 5, 7, 9, and 12 recite allowable subject matter. Certain assumptions that make the limitations clear have been considered for the claims, as described elsewhere in this Office action. The claims should be rewritten to overcome any objections or rejections under 35 U.S.C. 112, especially as appearing in this Office action.

2. Claims 1, 8, and 9, and by dependency claims 2-7, provide a whole structure and interaction expressed by the combination of all limitations that is not made obvious compared to the prior art of record for the whole invention of those independent claims. No particular reference provides relevant, objective evidence to make the claimed devices, methods, and media obvious by changing the closest prior art (Tsushima, Omori, Dejaco) to have prediction taps extracted for synthesized sound and used for predicting speech, when the class of speech must be found and preset tap coefficients associated with the class from learning must be acquired and used to find prediction values of target speech.

3. Claim 12 recites allowable subject matter when considered with the limitations of the base claim 10. The claim would be allowable over the prior art of record if rewritten to include all of the limitations of the base claim. The whole structure and interaction expressed by the combination of all limitations is not made obvious compared to the prior art of record for the whole invention of those dependent claims, particularly with class taps extracted from residual signals and learning to find tap coefficients from class to class to use with synthesized sound.

Information Disclosure Statement

4. A copy of the International Search Report (Form PCT/ISA/210) (received April 5, 2002) is present. The search report and its cited documents have been considered by the Examiner.

Drawings

5. Figures 1 and 2 are objected to because each is not designated by a legend such as --PRIOR ART--. The legend is necessary in order to clarify what Applicant's invention is because only that which is old is illustrated. See MPEP § 608.02(g). The specification describes Figs. 1 and 2 as conventional on page 1.

6. A permanent replacement sheet (a minimum being a black ink sketch suitable for publication) in compliance with 37 CFR 1.121(d) containing at least the corrected, substitute drawing for each figure being corrected is required in response to this Office action. Any amended, replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. Corrected drawing sheets may no longer be held in abeyance. REPLACEMENT SHEETS LESS THAN THE MINIMUM DESCRIBED ABOVE WILL NOT BE CONSIDERED A *BONA FIDE* ATTEMPT TO PROVIDE A COMPLETE REPLY. See 37 C.F.R. § 1.121(d), § 1.81(d), § 1.85(a), and MPEP § 608.02 IV.

7. The Examiner notes, without objection, the possibility of informalities in the drawings. It is in the best interests of the patent community that the Applicant be aware of these editorial situations and consider correcting minor errors during normal review and revision of the drawings.

In Fig. 2, items 25 and 29, did the Applicant intend to illustrate a connection between these items? The discussion on page 9 describes routing from item 25 to item 29.

Specification

8. The title is objected to because it is not sufficiently descriptive of the invention. A new title is required that is clearly indicative of the invention to which the claims are directed. See MPEP § 606.01. The Examiner suggests that the Applicant consider a title including these elements: "High-Quality Speech Synthesis Device and Method by Classification and Prediction Processing of Synthesized Sound."

9. The Examiner notes, without objection, the possibility of informalities in the specification. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. The Applicant's cooperation is requested to consider correcting minor errors of which the Applicant may become aware during normal review and revision of the disclosure.

a. At page 8, line next-to-last, did the Applicant intend the word to be --code--?

b. At page 9, line beginning *apparatus*, did the Applicant intend the word to be --the--?

c. At page 19, line 5, did the Applicant intend the word to include the word "and"?

d. At page 65, line beginning *The demultiplexer*, did the Applicant intend the word to be --residual--?

e. At page 74, line beginning *to*, did the Applicant intend the word to be --sent--?

Claim Informalities

10. Claim 4 is objected to under 37 CFR 1.75(a) because the meaning of the phrase "said class taps" (line 2) needs clarification. Because only one class tap was previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --said class tap--.

11. Claims 5, 10, 14, 15, 23, 37, 38, 43, 48, 52, 53, and by dependency claims 11-13, by dependency claims 49-51, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "the prediction errors" (as in claim 2, line 2) needs clarification. Because it was not previously recited that errors occur, it may be unclear as to what element this phrase refers. For example, what happens to the subject matter if the predicted values have no error? To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --prediction errors--. Note that "the prediction errors" appears in the next line and in claims dependent to claim 10.

12. Claims 5, 23, 43 are objected to under 37 CFR 1.75(a) because the meaning of the phrase "the predicted values" (for example claim 5, lines 2-3) needs clarification. Because no predicted values were previously recited, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --the prediction values--.

13. Claims 7 and 13 are objected to under 37 CFR 1.75(a) because the meaning of the phrase "the speech" (line 2) needs clarification. Because both speech of high sound quality and target speech were previously recited, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --speech--.

14. Claims 7, 13, 26, 36 are objected to under 37 CFR 1.75(a) because the meaning of the phrase "the CELP (Code Excited Linear Prediction Coding) system" (line 2-3) needs clarification. Because no CELP system was previously recited for the data processing device, and the claim does not make clear to which particular, generic CELP it is referring, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --a CELP (Code Excited Linear Prediction Coding) system--.

15. Claim 9 is objected to under 37 CFR 1.75(a) because the meaning of the phrase "said method" (line beginning *said speech*) needs clarification. Because no method was previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --said program--.

16. Claims 10, 14, 15, 39, 46, 47, 53, and by dependency claims 11-13, by dependency claims 40-45, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "said tap coefficients" (for example claim 10, next-to-last line) needs clarification. Because no tap coefficients were previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --tap coefficients--. Note that "said tap coefficients" or "the tap coefficients" appears in the next line and in dependent claims.

17. Claim 12 is objected to as being (directly or indirectly) dependent upon a rejected base claim. See MPEP § 608.01(n)V.

18. Claim 14 is objected to under 37 CFR 1.75(a) because the meaning of the phrase "said learning device" (line beginning *sound*) needs clarification. Because no learning device was

previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --said learning method--.

19. Claim 15 is objected to under 37 CFR 1.75(a) because the meaning of the phrase "said learning device" (line beginning *sound*) needs clarification. Because no learning device was previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --said learning program--.

20. Claims 16, 17, 19, 23, 24, 27, 28, 29, 30, 31 (two occurrences), 32, 33, 35, 38, and by dependency claims 17-26, by dependency claims 30-36, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "said filter data" (for example claim 16, line beginning *coefficients*) needs clarification. Because generated filter data was previously recited, but decoded filter data was previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --the generated filter data-- or --the associated filter data--.

21. Claim 19, and by dependency claims 20-22, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "said prediction tap" (lines 5-6) needs clarification. Because no particular prediction tap was previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --said prediction taps--.

22. Claim 21, and by dependency claim 22, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "said class tap" (lines 2-3) needs clarification. Because no particular class

tap was previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --said class taps--.

23. Claims 28, 38, 47, 53 are objected to under 37 CFR 1.75(a) because each claim appears to set forth a medium that comprises steps. How a medium comprises steps needs clarification. Patent practice would typically have a method or program comprising steps. To further timely prosecution and evaluate prior art, the Examiner has interpreted these claims in a manner similar to claim 9, as --said program comprising:-- the steps in the body of the claim.

24. Claim 31, and by dependency claims 32-34, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "said filter data of interest" (for example claim 31, line 4) needs clarification. Because generated filter data was previously recited, but decoded filter data was previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --filter data of interest--. Note that "said filter data of interest" appears in dependent claims.

25. Claims 33, 34, and by dependency claim 34, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "said class taps" (line 5) needs clarification. Because no class taps were previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --said class tap--.

26. Claim 35 is objected to under 37 CFR 1.75(a) because the meaning of the phrase "said input signal" (line 2) needs clarification. Because no input signal was previously said, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --an input signal--.

27. Claims 39, 46 (two occurrences), 47, 48 (two occurrences), 52 (two occurrences), 53 (two occurrences), and by dependency claims 40-45, by dependency claims 49-51, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "the information derived from said code" (line beginning *sound, said*) needs clarification. Because it was not previously recited that any information was derived from said code, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --information derived from said code--. Note that "the information derived from said code" appears in dependent claims.

28. Claims 40, 41, 42, 43, 44, and 45 are objected to under 37 CFR 1.75(a) because the meaning of the phrase "The data processing device" (line 1) needs clarification. Because no data processing device was previously recited, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --The speech processing device--.

29. Claim 42 is objected to under 37 CFR 1.75(a) because the meaning of the phrase "class taps" (line 2) needs clarification. Is it --a class tap-- or --said class taps--?

30. Claims 46, 47, 48, 52, 53, and by dependency claims 49-51, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "the speech of high sound quality" (lines 1-2) needs clarification. Because no speech of high sound quality was previously recited and speech of high sound quality does not inherently result from synthesized sound, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --speech of high sound quality--.

31. Claim 49 is objected to under 37 CFR 1.75(a) because the meaning of the phrase "the one-dimensional linear predictive calculations" (lines 3-4) needs clarification. Because no one-dimensional linear predictive calculations were previously recited, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phase as --one-dimensional linear predictive calculations--.

32. The Examiner notes, without objection, that the following phrases provide an inherent antecedent reference by their recitation in place: (claims 1, 8, 9, 10, 14, 15, 39) "the speech of high sound quality"; (claims 1, 8, 9, 10, 14, 15, 39, 47, 48, 52, 53) "the synthesized sound obtained"; (claim 1, 8, 9, 48) "the class of said target speech"; (claim 3) "the class basis"; (claims 16, 27, 28, 29, 37, 38) "the speech based on"; (claims 20, 21, 33) "the class for said filter data of interest"; (claim 39) "the prediction values". Because the claims do not include an antecedent recitation of those phrases, the Applicant may wish to consider if the phrases recite the claimed subject matter that the Applicant wants.

33. The form of the claims does not follow Office practice. While there is no set statutory form for claims, the present Office practice is to insist that each claim must be the object of a sentence starting with "I (or we) claim", "The invention claimed is", or the equivalent. The Applicant is encouraged to insert a desired introduction before claim 1. If, at the time of allowance, appropriate terminology is not present, it is inserted by the technical staff. See MPEP § 608.01(m).

Claim Rejections - 35 USC § 102

34. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Tsushima

35. Claims 10-11, 14, 16-25, 27, 29-35, 37, 39-44, 46, 48-50, and 52 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsushima et al. [US Patent 5,978,759].

36. Regarding claim 10, Tsushima [at columns 3-4] describes an embodiment that learns tap coefficients in which a preset code is the basis for finding prediction values of filter data for LPC speech synthesis. Tsushima describes the content and functionality of the recited limitations recognizable as a whole to one versed in the art as the following terminology:

a preset code [at column 4, lines 11-30, as created, codebook, spectral envelope codes];

tap extraction means for extracting taps from said code [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes];

said taps being used for classifying target speech [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

the target speech is of high sound quality [at column 5, lines 30-40, as the expansion from narrowband minimizes distance between the original speech and synthesized speech];

prediction values of said target speech are to be found [at column 3, lines 47-column 4, line 15, as the spectral envelope converter converts spectral envelope parameters, using spectral

envelope parameters of filter coefficients of a filter and the linear mapping function obtained from the spectral envelope codebook, into wider-bandwidth spectral envelope parameters];

classification means for finding a class of said target speech based on said taps [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

they are class taps [at column 5, lines 20-29, as each linear mapping function corresponds to a word mapped into the subspace division of M subspaces];

learning means for carrying out learning so that prediction errors of the prediction values of said speech of high sound quality obtained on carrying out predictive calculations using tap coefficients and the synthesized sound will be statistically minimum, from class to class [at column 4, line 61-column 5, line 32, as learning spectral envelope codes and corresponding linear mapping functions so that a distance between the linear predictive word speech analyzed to LPC parameters and a word speech mapped into the subspace of linear mapping functions can be minimized according to distances between the original speech and the synthesized speech for word speech mapped into the subspace division of M subspaces].

37. Regarding claim 11, Tsushima describes repeated claim elements as for claim 10, and Tsushima also describes:

one-dimensional linear predictive calculations [at column 3, lines 18-45, as the LPC analysis obtains spectral envelope parameters by LPC coefficients denoted by a_i, i=1, 2, . . . , p of a filter].

38. Claim 14 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 10. Because Tsushima describes the similar limitations as indicated there, this claim thus is anticipated accordingly.

39. Regarding claim 16, Tsushima [at columns 3-4] describes an embodiment in which a preset code is the basis for generating filter data for LPC speech synthesis. Tsushima describes the content and functionality of the recited limitations recognizable as a whole to one versed in the art as the following terminology:

a preset code [at column 4, lines 11-30, as created, codebook, spectral envelope codes];

code decoding means for decoding it to output decoded filter data [at column 4, lines 51-60, as linear mapping function calculator converts spectral envelope parameters correspondent to the linear spectral code and outputs them];

acquisition means for acquiring preset tap coefficients as found by carrying out learning [at column 4, lines 15-54, as selector selects spectral envelope codes corresponding to minimum distance to code in codebook created by assigning parameters to parameter subspaces];

prediction means for carrying out preset predictive calculations, using the tap coefficients and the decoded filter data, to find prediction values of the filter data [at column 3, lines 47-column 4, line 15, as the spectral envelope converter converts spectral envelope parameters, using spectral envelope parameters of filter coefficients of a filter and the linear mapping function obtained from the spectral envelope codebook, into wider-bandwidth spectral envelope parameters];

and send the found prediction values to a speech synthesis system [at column 3, lines 55-57, as the output of the spectral envelope converter used by an LPC synthesizer to synthesize a speech signal].

40. Regarding claim 17, Tsushima also describes:

one-dimensional linear predictive calculations to find prediction values of the filter data [at column 3, lines 18-45, as the LPC analysis obtains spectral envelope parameters by LPC coefficients denoted by a_i, i=1, 2, . . . , p of a filter].

41. Regarding claim 18, Tsushima also describes:

tap coefficients from storage holding the tap coefficients [at column 4, lines 10-13, as spectral envelope codes of the codebook].

42. Regarding claim 19, Tsushima also describes:

prediction tap extracting means for extracting prediction taps being usable along with said tap coefficients for predicting said filter data, as filter data of interest, the prediction values of which are to be found [at column 3, lines 47-52, as spectral envelope converter converts into spectral envelope parameters of a bandwidth, which is wider];

said prediction means carrying out prediction calculations using said prediction tap and tap coefficients [at column 3, lines 47-column 4, line 15, as the spectral envelope converter converts spectral envelope parameters, using spectral envelope parameters of filter coefficients of a filter and the linear mapping function obtained from the spectral envelope codebook, into wider-bandwidth spectral envelope parameters].

43. Regarding claim 20, Tsushima also describes:

tap extraction means for extracting taps from said decoded filter data [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope];

said taps being used for sorting said filter data of interest to one of a plurality of classes, by way of classification, and classification means for finding the class for said filter data of interest, based on said taps [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

they are class taps [at column 5, lines 20-29, as each linear mapping function corresponds to a word mapped into the subspace].

44. Regarding claim 21, Tsushima also describes:

tap extraction means for extracting taps from said code [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes];

said taps being used for sorting said filter data of interest to one of a plurality of classes, by way of classification, and classification means for finding the class for said filter data of interest, based on said taps [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

they are class taps [at column 5, lines 20-29, as each linear mapping function corresponds to a word mapped into the subspace];

said prediction means carrying out predictive calculations using said prediction taps and said tap coefficients [at column 3, lines 47-column 4, line 15, as the spectral envelope converter converts spectral envelope parameters, using spectral envelope parameters of filter coefficients of a filter and the linear mapping function obtained from the spectral envelope codebook, into wider-bandwidth spectral envelope parameters].

the taps and coefficients associated with the class of said filter data of interest [at column 6, lines 43-45, as the extracted wideband spectral envelope code is made to be the converted spectral envelope parameters in the present composition].

45. Regarding claim 22, Tsushima also describes:

extract taps from both said code and said decoded filter data [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes];

they are class taps [at column 5, lines 20-29, as each linear mapping function corresponds to a word mapped into the subspace].

46. Regarding claim 23, Tsushima also describes:

the tap coefficients have been obtained on carrying out learning so that the prediction errors of the predicted values of said filter data obtained on carrying out preset predictive calculations employing said tap coefficients and decoded filter data will be statistically minimum [at column 4, line 61-column 5, line 29, as learning spectral envelope codes and corresponding linear mapping functions so that a distance between the linear predictive word speech analyzed to LPC parameters and a word speech mapped into the subspace of linear mapping functions can be minimized].

47. Regarding claim 24, Tsushima also describes:

said filter data is at least one of said linear prediction coefficients (or other) [at column 3, lines 49-52, as spectral envelope parameters outputted from the LPC analyzer are converted].

48. Regarding claim 25, Tsushima also describes:

a speech synthesis filter [at column 3, lines 55-56, as an LPC synthesizer synthesizes a speech signal].

49. Claim 27 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 16. Because Tsushima describes the similar limitations as indicated there, this claim thus is anticipated accordingly.

50. Regarding claim 29, Tsushima [at columns 3-4] describes an embodiment that learns tap coefficients in which a code is the basis for finding prediction values of filter data for LPC speech synthesis. Tsushima describes the content and functionality of the recited limitations recognizable as a whole to one versed in the art as the following terminology:

the code [at column 4, lines 11-30, as created, codebook, spectral envelope codes];

code decoding means for decoding it to output decoded filter data [at column 4, lines 51-60, as linear mapping function calculator converts spectral envelope parameters correspondent to the linear spectral code and outputs them];

learning means for carrying out learning so that prediction errors of predicted values of filter data obtained on carrying out predictive calculations using said tap coefficients and decoded filter data will be statistically smallest to find said tap coefficients [at column 4, line 61-column 5, line 29, as learning so that a distance between the linear predictive word speech analyzed to LPC parameters and a word speech mapped into the subspace of linear mapping functions can be minimized for learning spectral envelope codes and corresponding linear mapping functions].

51. Regarding claim 30, Tsushima describes repeated claim elements as for claim 29, and Tsushima also describes:

one-dimensional linear predictive calculations [at column 3, lines 18-45, as the LPC analysis obtains spectral envelope parameters by LPC coefficients denoted by a_i, i=1, 2, . . . , p of a filter].

52. Regarding claim 31, Tsushima describes included claim elements as for claim 29, and Tsushima also describes:

predictive tap extraction means for extracting from said decoded filter data prediction taps used along with said tap coefficients for predicting said filter data as filter data of interest, the prediction values of which are to be found [at column 3, lines 47-52, as spectral envelope converter converts into spectral envelope parameters of a bandwidth, which is wider];

learning so that the prediction errors of the predicted values of said filter data obtained on carrying out predictive calculations employing said tap coefficients and prediction taps will be statistically smallest [at column 4, line 61-column 5, line 29, as learning spectral envelope codes and corresponding linear mapping functions so that a distance between the linear predictive word speech analyzed to LPC parameters and a word speech mapped into the subspace of linear mapping functions can be minimized].

53. Regarding claim 32, Tsushima also describes:

tap extraction means for extracting taps from said decoded filter data [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope];

said taps being used for sorting said filter data of interest to one of a plurality of classes, by way of classification, and classification means for finding the class for said filter data of interest, based on said taps [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

they are class taps [at column 5, lines 20-29, as each linear mapping function corresponds to a word mapped into the subspace];

learning so that the prediction errors of the predicted values of said filter data obtained on carrying out predictive calculations using said tap coefficients and prediction taps will be statistically smallest [at column 4, line 61-column 5, line 29, as learning spectral envelope codes

and corresponding linear mapping functions so that a distance between the linear predictive word speech analyzed to LPC parameters and a word speech mapped into the subspace of linear mapping functions can be minimized];

the taps and coefficients associated with the class of said filter data of interest [at column 6, lines 43-45, as the extracted wideband spectral envelope code is made to be the converted spectral envelope parameters in the present composition].

54. Regarding claim 33, Tsushima also describes:

tap extraction means for extracting taps from said code [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes];

said tap being used for sorting said filter data of interest to one of a plurality of classes, by way of classification, and classification means for finding the class for said filter data of interest, based on said taps [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

they are class taps [at column 5, lines 20-29, as each linear mapping function corresponds to a word mapped into the subspace];

learning so that the prediction errors of the predicted values of said filter data obtained on carrying out preset predictive calculations employing said tap coefficients and prediction taps will be statistically smallest [at column 4, line 61-column 5, line 29, as learning spectral envelope codes and corresponding linear mapping functions so that a distance between the linear predictive word speech analyzed to LPC parameters and a word speech mapped into the subspace of linear mapping functions can be minimized].

55. Claim 34 sets forth additional limitations similar to limitations set forth in claim 22. Tsushima also describes the additional limitations as indicated there.

56. Claim 35 sets forth additional limitations similar to limitations set forth in claim 24. Tsushima also describes the additional limitations as indicated there.

57. Claim 37 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 29. Because Tsushima describes the similar limitations as indicated there, this claim thus is anticipated accordingly.

58. Regarding claim 39, Tsushima [at columns 3-4] describes an embodiment in which a preset code is the basis for finding prediction values of filter data for LPC speech synthesis. Tsushima describes the content and functionality of the recited limitations recognizable as a whole to one versed in the art as the following terminology:

a preset code [at column 4, lines 11-30, as created, codebook, spectral envelope codes];

prediction tap extracting means for extracting prediction taps usable for predicting target speech, the prediction values of which are to be found [at column 3, lines 47-57, as spectral envelope converter converts into spectral envelope parameters of a bandwidth, which is wider, and synthesizes speech from the output];

the target speech is of high sound quality [at column 5, lines 30-40, as the expansion from narrowband minimizes distance between the original speech and synthesized speech];

tap extraction means for extracting taps from said code (or other) [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes];

said taps being used for sorting the target speech to one of a plurality of classes, by way of classification, and acquisition means for acquiring tap coefficients associated with the class of said target speech from the tap coefficients [at column 5, lines 20-29, as the mapping functions

correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

prediction means for finding the prediction values of said target speech using said tap coefficients and said prediction taps [at column 3, lines 47-column 4, line 15, as the spectral envelope converter converts spectral envelope parameters, using spectral envelope parameters of filter coefficients of a filter and the linear mapping function obtained from the spectral envelope codebook, into wider-bandwidth spectral envelope parameters];

they are class taps associated with the class of said target speech as found by learning from one class to another [at column 5, lines 20-29, as each linear mapping function corresponds to a word mapped into the subspace division of M subspaces].

59. Regarding claim 40, Tsushima describes repeated claim elements as for claim 29, and Tsushima also describes:

one-dimensional linear predictive calculations [at column 3, lines 18-45, as the LPC analysis obtains spectral envelope parameters by LPC coefficients denoted by a_i, i=1, 2, . . . , p of a filter].

60. Regarding claim 41, Tsushima describes repeated claim elements as for claim 29, and Tsushima also describes:

the tap coefficients of the class are acquired from storage means [at column 4, lines 10-13, as spectral envelope codes of the codebook].

61. Regarding claim 42, Tsushima also describes:

said prediction tap extraction means (or other) extracts said prediction taps (or other) from said code (or other) [at column 6, lines 38-42, as the comparator extracts the wideband spectral

envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes].

62. Regarding claim 43, Tsushima also describes:

said tap coefficients have been obtained on carrying out learning so that prediction errors of the prediction values of said speech of high sound quality obtained on carrying out preset predictive calculations employing said tap coefficients and prediction taps will be statistically minimum [at column 4, line 61-column 5, line 29, as learning spectral envelope codes and corresponding linear mapping functions so that a distance between the linear predictive word speech analyzed to LPC parameters and a word speech mapped into the subspace of linear mapping functions can be minimized].

63. Claim 44 sets forth additional limitations similar to limitations set forth in claim 25. Tsushima also describes the additional limitations as indicated there.

64. Claim 46 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 39. Tsushima describes those functional limitations as indicated there, and also describes further additional limitations as follows:

the prediction values are found from said code (or other) [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes];

a classification step of finding the class of said target speech based on said class tap [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function].

65. Regarding claim 48, Tsushima [at columns 3-4] describes an embodiment that learns tap coefficients in which a preset code is the basis for finding prediction values of filter data for LPC speech synthesis. Tsushima describes the content and functionality of the recited limitations recognizable as a whole to one versed in the art as the following terminology:

the preset code [at column 4, lines 11-30, as created, codebook, spectral envelope codes];

prediction tap extraction means for extracting prediction taps usable for predicting target speech, the prediction values of which are to be found [at column 3, lines 47-57, as spectral envelope converter converts into spectral envelope parameters of a bandwidth, which is wider, and synthesizes speech from the output];

tap extraction means for extracting taps from said code (or other) [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes];

they are class taps useable for sorting the target speech to one of a plurality of classes, by way of classification [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

the prediction values are found from said code (or other) and the class taps are extracted from said code (or other) [at column 6, lines 38-42, as the comparator extracts the wideband spectral envelope code corresponding to the narrowband spectral envelope & at column 4, lines 11-30, as created, codebook, spectral envelope codes];

classification means for finding the class of said target speech based on said class taps [at column 5, lines 20-29, as the mapping functions correspond to narrowband word speech mapped into the corresponding subspace by the mapping function];

learning means for carrying out learning so that prediction errors of the prediction values of said speech of high sound quality, obtained on carrying out predictive calculations using said tap coefficients and said prediction taps will be statistically smallest [at column 4; line 61-column 5, line 29, as learning spectral envelope codes and corresponding linear mapping functions so that

a distance between the linear predictive word speech analyzed to LPC parameters and a word speech mapped into the subspace of linear mapping functions can be minimized].

66. Regarding claim 49, Tsushima describes repeated claim elements as for claim 48, and Tsushima also describes:

one-dimensional linear predictive calculations [at column 3, lines 18-45, as the LPC analysis obtains spectral envelope parameters by LPC coefficients denoted by a_i, i=1, 2, . . . , p of a filter].

67. Claim 50 sets forth additional limitations similar to limitations set forth in claim 42. Tsushima also describes the additional limitations as indicated there.

68. Claim 52 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 48. Because Tsushima describes the similar limitations as indicated there, this claim thus is anticipated accordingly.

Claim Rejections - 35 USC § 103

69. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was

made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Tsushima and Omori

70. Claims 13, 15, 26, 28, 36, 38, 45, 47, 51, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsushima et al. [US Patent 5,978,759] in view of Omori et al. [US Patent 6,539,355].

71. Regarding claim 13, Tsushima describes the included claim elements by dependency as indicated elsewhere in this Office action. Tsushima [at column 3, lines 52-58] also describes the residual signal that is also input to the synthesizer to synthesize the speech signal. However, Tsushima does not describe a CELP-coding system, which should include coding for the residual, coefficients, and possibly other coded characteristics.

Like Tsushima, Omori [at columns 8-9 and 13-14] describes a speech bandwidth expanding receiver, and Omori describes:

encoding the speech in accordance with a CELP system [at column 6, lines 45-52, as the encoding method used in the speech encoder is PSI-CELP].

As indicated, Omori had described encoding the speech in accordance with a CELP system that was known to artisans at the time of invention. Since Omori [at column 16, lines 42-48] also points out that encoding the speech in accordance with a CELP system has the advantage of a simple method of representing the speech, but providing a source of excitation of sufficient quality to preserve the structure and power of the speech, it would have been obvious to one of ordinary skill in the art of speech codecs at the time of invention to include the known concepts, at least including CELP encoding of speech, as an encoding system suitable for Tsushima because it has the advantage of a simple method of representing the speech, but providing a source of excitation of sufficient quality to preserve the structure and power of the speech.

72. Claim 15 sets forth steps with limitations comprising the functionality associated with using the system recited in claim 14. Tsushima describes the similar limitations as indicated there; however, Tsushima does not explicitly describe a system embodiment having a recording medium with a program of the steps.

Like Tsushima, Omori [at columns 8-9 and 13-14] describes a speech bandwidth expanding receiver, and Omori describes:

a recording medium (of the steps) [at column 8, line 30, as the signal processor of the device];

a program (of the steps) [at column 18, line 38, as program and step(s)];

As indicated, Omori had described a recording medium having a program of steps for bandwidth expansion of speech at the time of invention. To the extent that a programmed processor is not necessarily in Tsushima's system, it would have been obvious to one of ordinary skill in the art of implementing functional descriptions of operations at the time of invention to include the concept of signal processor media used with program instructions to implement the processing functions of Tsushima because that would have provided the best implementation under particular circumstances identified and evaluated by a skilled artisan. For example, it is within the ordinary skill of an artisan to determine that software elements, such as Omori used, benefits changing processing functions or adding other processing functions because software elements are more easily modified than hardware elements.

73. Claim 26 sets forth additional limitations similar to limitations set forth in claim 13. Tsushima and Omori describe and make obvious the additional limitations as indicated there.

74. Claim 28 sets forth limitations similar to limitations set forth in claim 27 and with additional limitations similar to the additional limitations of claim 15. Tsushima and Omori describe and make obvious the limitations as indicated there.

75. Claim 36 sets forth additional limitations similar to limitations set forth in claim 13. Tsushima and Omori describe and make obvious the additional limitations as indicated there.

76. Claim 38 sets forth limitations similar to limitations set forth in claim 37 and with additional limitations similar to the additional limitations of claim 15. Tsushima and Omori describe and make obvious the limitations as indicated there.

77. Claim 45 sets forth additional limitations similar to limitations set forth in claim 13. Tsushima and Omori describe and make obvious the additional limitations as indicated there.

78. Claim 47 sets forth steps with limitations comprising the functionality associated with using the system recited in claim 39 and with additional limitations similar to the additional limitations of claim 15. Tsushima and Omori describe and make obvious the limitations as indicated there.

79. Claim 51 sets forth additional limitations similar to limitations set forth in claim 13. Tsushima and Omori describe and make obvious the limitations as indicated there.

80. Claim 53 sets forth limitations similar to limitations set forth in claim 52 and with additional limitations similar to the additional limitations of claim 15. Tsushima and Omori describe and make obvious the limitations as indicated there.

Conclusion

81. The following references here made of record are considered pertinent to applicant's disclosure:

Kitayama et al. [US Patent 4,610,022] uses a nonlinear circuit to produce a higher harmonic of a decoded voice signal and an emphasis filter of the high frequency range.

Tasaki [US Patent 5,822,732] describe that post-filters for speech modification in a synthesizer base quality improvement processing on filter parameters decoded from received codes.

Jarvinen et al. [US Patent 5,946,651] optionally uses linear predictive analysis of synthesized speech and filtering the excitation signal to improve sound quality upon re-synthesis.

Mermelstein et al. [US Patent 5,995,923] recomputes coded LPC coefficients for a pseudo-coding format and regenerates an excitation signal to match a target synthesis filter.

Dejaco [US Patent 6,260,009] recomputes coded LPC coefficients to match an output CELP format and synthesizes speech to re-encode excitation parameters into the output CELP.

82. Any response to this action should be mailed to:

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Commissioner for Patents
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(571) 273-8300, (for both formal communications intended for entry and for informal or draft communications, but please label informal fax as "PROPOSED" or "DRAFT")

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83. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donald L. Storm, of Division 2626, whose telephone number is (571) 272-7614. The examiner can normally be reached on weekdays between 7:00 AM and 3:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571) 272-7602.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Inquiries regarding the status of submissions relating to an application or questions on the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 571-272-4100 between the hours of 6 a.m. and midnight Monday through Friday EST, or by e-mail at: ebc@uspto.gov. For general information about the PAIR system, see http://pair-direct.uspto.gov.

Donald L. Storm

April 12, 2006

Donald L. Storm
Examiner, Division 2626